

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>5470.316WO</b>	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. <b>PCT/US01/31504</b>	International filing date ( <i>day/month/year</i> ) <b>10 October 2001 (10.10.2001)</b>	Priority date ( <i>day/month/year</i> ) <b>12 October 2000 (12.10.2000)</b>
International Patent Classification (IPC) or national classification and IPC <b>IPC(7): G03F 7/004, 7/26, 7/36 and US Cl.: 430/270.1, 311, 313, 314, 329</b>		
Applicant <b>UNIVERSITY AT NORTH CAROLINA AT CHAPEL HILL</b>		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of ___ sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of ___ sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li>I <input checked="" type="checkbox"/> Basis of the report</li> <li>II <input type="checkbox"/> Priority</li> <li>III <input type="checkbox"/> Non-establishment of report with regard to novelty, inventive step and industrial applicability</li> <li>IV <input type="checkbox"/> Lack of unity of invention</li> <li>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li>VI <input type="checkbox"/> Certain documents cited</li> <li>VII <input type="checkbox"/> Certain defects in the international application</li> <li>VIII <input type="checkbox"/> Certain observations on the international application</li> </ul>		
Date of submission of the demand <b>02 April 2002 (02.04.2002)</b>	Date of completion of this report <b>26 November 2002 (26.11.2002)</b>	
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer <b>Mark Huff</b>  Telephone No. 703-308-0661	

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US01/31504

**I. Basis of the report**1. With regard to the **elements** of the international application:\*

- ☒ the international application as originally filed.
- ☒ the description:  
pages 1-31 as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.
- ☒ the claims:  
pages 32-44, as originally filed  
pages NONE, as amended (together with any statement) under Article 19  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.
- ☒ the drawings:  
pages 1-2, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.
- ☐ the sequence listing part of the description:  
pages NONE, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages NONE
- ☐ the claims, Nos. NONE
- ☐ the drawings, sheets/~~fig~~ NONE

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:  
ROBERT J. SMITH  
MYERS BIGEL SIBLEY & SAJOVEC  
P.O. BOX 37428  
RALEIGH, NC 27627

## PCT

### WRITTEN OPINION

(PCT Rule 66)

Applicant's or agent's file reference  5470.316WO		Date of Mailing (day/month/year)  REPLY DUE  within 2 months/days from the above date of mailing
International application No.  PCT/US01/31504	International filing date (day/month/year)  10 October 2001 (10.10.2001)	Priority date (day/month/year)  12 October 2000 (12.10.2000)
International Patent Classification (IPC) or both national classification and IPC  IPC(7): G03F 7/004, 7/26, 7/36 and US Cl.: 430/270.1, 311, 313, 314, 329		
Applicant  UNIVERSITY AT NORTH CAROLINA AT CHAPEL HILL		

1. This written opinion is the first (first, etc.) drawn by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:
  - I ☒ Basis of the opinion
  - II ☐ Priority
  - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  - IV ☐ Lack of unity of invention
  - V ☒ Reasoned statement under Rule 66.2 (a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  - VI ☐ Certain documents cited
  - VII ☐ Certain defects in the international application
  - VIII ☐ Certain observations on the international application
3. The applicant is hereby **invited to reply** to this opinion.
 

**When?** See the time limit indicated above. ~~The applicant may, before the expiration of that time limit, request this Authority to grant an extension. See rule 66.2(d).~~

**How?** By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

**Also** For an additional opportunity to submit amendments, see Rule 66.4.  
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 *bis*.  
For an informal communication with the examiner, see Rule 66.6

**If no reply is filed**, the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 12 February 2003 (12.02.2003)

Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer  Mark Huff  Telephone No. 703-308-0661
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**WRITTEN OPINION**

International application No.

PCT/US01/31504

**I. Basis of the opinion**

1. With regard to the **elements** of the international application:\*

- ☒ the international application as originally filed
- ☒ the description:  
 pages 1-31, as originally filed  
 pages NONE, filed with the demand  
 pages NONE, filed with the letter of \_\_\_\_\_.
- ☒ the claims:  
 pages 32-44, as originally filed  
 pages NONE, as amended (together with any statement) under Article 19  
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- ☒ the drawings:  
 pages 1-2, as originally filed  
 pages NONE, filed with the demand  
 pages NONE, filed with the letter of \_\_\_\_\_.
- ☐ the sequence listing part of the description:  
 pages NONE, as originally filed  
 pages NONE, filed with the demand  
 pages NONE, filed with the letter of \_\_\_\_\_.

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
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3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the written opinion was drawn on the basis of the sequence listing:

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- ☐ filed together with the international application in computer readable form.
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- ☐ furnished subsequently to this Authority in computer readable form.
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4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages NONE
- ☐ the claims, Nos. NONE
- ☐ the drawings, sheets/fig NONE

5. ☐ This opinion has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed."

**WRITTEN OPINION**

International application No.  
PCT/US01/31504

**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

**1. STATEMENT**

Novelty (N)	Claims <u>1-33, 67</u>	YES
	Claims <u>34-66</u>	NO
Inventive Step (IS)	Claims <u>6, 7, 22, 23</u>	YES
	Claims <u>1-5, 8-21, 24-67</u>	NO
Industrial Applicability (IA)	Claims <u>1-67</u>	YES
	Claims <u>NONE</u>	NO

**2. CITATIONS AND EXPLANATIONS**

Claims 33-67 lack novelty under PCT Article 33(2) as being anticipated by Allen (US Patent 5,665,527).

Allen discloses coating on a substrate a polymeric film, a photosensitive generator and acid labile groups. The first component of the polymeric film is a polymer such as fluorinated polymers (polymethylmethacrylate) and polymers having alkylsiloxy substituents (col.2, 21-46). The film is imagewise exposed to DUV or x-ray with less than about 1-50 mJ/cm<sup>2</sup> (col.4, 45-59). The negative tone image is then developed using carbon dioxide critical fluid (col.4, 29-53).

Claims 1-5, 8-21, 24-43, 46-56 and 59-67 lack an inventive step under PCT Article 33(3) as being obvious over DeSimone (US Patent 6,001,418).

DeSimone discloses a spin coating method. A thin film of a polymeric material, such as a photoresist or interlayer dielectric, is coated by applying a carbon dioxide liquid to a surface portion of the substrate as a carrier. The carbon dioxide liquid may also be used to remove materials from a substrate. Resists may contain additives such as photoacid generators. In a preferred embodiment the mixture is comprised of carbon dioxide and a fluoropolymer, such as a fluoroacrylate polymer (col.1, 12-45, col.4, 11-40). DeSimone does not disclose imagewise exposing the photoresist layer. However it would have been obvious to one of ordinary skill in the art to expose the photoresist to light through a mask because photoresists are conventionally used to form a pattern in this manner.

Claims 34-40, 44-51, 53, 57-63, 65 and 66 lack an inventive step under PCT Article 33(3) as being obvious over Gleason (US Patent 6,045,877).

Gleason discloses a pyrolytic chemical vapor deposition of silicone films. A pyrolytic CVD film is deposited on a silicon wafer and imagewise exposed to radiation. The exposed resist is then exposed to an oxygen containing plasma or supercritical CO<sub>2</sub> development process in order to photo oxidize portions of the resist, resulting in a photoresist pattern which may be used as an etching mask (col.19, 1-col.20, 36). Gleason uses the resist pattern as an etching mask and does not disclose depositing a metal containing material or an ionic material on the surface of the wafer wherein the resist has been removed. However it would have been obvious to one of ordinary skill in the art to use the resist pattern as a mask for an additive process, instead of as a mask for a subtractive etching process, because both are conventional uses for resist patterns in the art.

Claims 1-67 have industrial applicability as defined by PCT Article 33(4). The method may be used to form a resist image when manufacturing an integrated circuit.

----- NEW CITATIONS -----

WRITTEN OPINION

International application No.  
PCT/US01/31504

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

**TIME LIMIT:**

The time limit set for response to a Written Opinion may not be extended. 37 CFR 1.484(d). Any response received after the expiration of the time limit set in the Written Opinion will not be considered in preparing the International Preliminary Examination Report.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.  
PCT/US01/31504**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. STATEMENT**

Novelty (N)	Claims <u>1-33, 67</u>	YES
	Claims <u>34-66</u>	NO
Inventive Step (IS)	Claims <u>6, 7, 22, 23</u>	YES
	Claims <u>1-5, 8-21, 24-67</u>	NO
Industrial Applicability (IA)	Claims <u>1-67</u>	YES
	Claims <u>NONE</u>	NO

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